SCHMIDT SCIENCE FELLOWS

Developing the next generation of science leaders
to transcend disciplines, advance discovery,
and solve the world's most pressing problems.

The inaugural 2018 Schmidt Science Fellows at Rhodes House, Oxford, UK with Executive Director, Dr Megan Wheeler; Chair of the Academic Council, Prof Sir Keith Burnett; and members of the Schmidt Futures team, including CEO, Eric Braverman; Chief Scientist, Dr Stu Feldman; Program Implementation Manager, Dave Vorhaus; and Program Implementation Officer, Diana Skurka.

Schmidt Science Fellows, in partnership with the Rhodes Trust, aims to develop the next generation of science leaders to transcend disciplines, advance discovery, and solve the world's most pressing problems.

We provide our Fellows with the skills and perspectives to harness and accelerate their exceptional scientific talents. Schmidt Science Fellows engage and coproduce with diverse thinkers in science, politics, society, and business to catalyze new ideas and connections.

Our Fellows are part of a community of lifelong fellowship and collaboration, between each other and with the cross-disciplinary networks they develop during the Fellowship year.

Working with partners in science, policy, and society, Schmidt Science Fellows are helping to shape the future of scientific culture, training, and discovery.

Welcome

Anti-microbial resistance. Climate change. Food insecurity. An aging population. Species extinction. The crises that face our planet and our society are broad, deep, and multi-faceted. They recognise none of the neat boundaries that are often and traditionally applied to science.

Schmidt Science Fellows span the breadth of natural sciences, engineering, mathematics, and computing – but they share a common drive to work across boundaries and to share knowledge between disciplines. Each of them is motivated by the desire to hasten the pace of scientific discovery to meet global challenges and improve society.

As a program we are fundamentally focused on these early-career scientists and how they can be supported, trained, nurtured, and challenged to become the next generation of scientific leaders. Through a unique postdoctoral placement in a world-leading laboratory, focused mentoring, and bespoke Global Meetings which offer professional development, visits to cutting-edge facilities, and discussions with renowned experts, our Fellows gain the experience they need to realize their ambitious scientific goals.

In addition, Schmidt Science Fellows join a lifelong community of like-minded scientists, including our alumni, partners, selectors, and supporters. This valuable network, committed to furthering science through interdisciplinarity, helps to identify and select our Fellows, support them in their work, and encourage them throughout their careers.

We hope you will join us in our effort to transcend boundaries between disciplines, accelerate discovery, and improve society.

Kind regards,

Dr Megan Wheeler
Executive Director

The Fellowship

Why

We are in a new era of science, technology, and innovation. Scientific progress and cutting-edge technologies are rapidly accelerating our understanding of the natural and built worlds. Research is increasingly global and can affect a wide range of pressing societal challenges. In this new era, the best scientists should draw insights from across numerous different disciplines, be able to apply new techniques, and possess a broad world-view informed by the intersections between science and society.

What

The Schmidt Science Fellows program provides the world's best emerging scientists with new skills and perspectives to develop novel solutions to society's challenges, become scientific and societal thought leaders, and accelerate ground-breaking discoveries.

We look for the brightest minds in the natural sciences, mathematics, engineering, and computing who are interested in broadening their horizons. Candidates to be Schmidt Science Fellows are expected to already have a strong track record of scientific achievement from their PhD studies, combined with a clear intellectual curiosity and desire to drive future discoveries. They should have the commitment and character to engage with society and global challenges to making a lasting difference in the world. Our Fellows should have a collaborative spirit with the experience and desire to work with diverse teams and across scientific disciplines.

How

Schmidt Science Fellows undertake a year-long postdoctoral placement. This placement commences after a Fellow successfully completes his or her PhD in the natural sciences, computing, engineering or mathematics. Fellows' placements will represent a significant disciplinary pivot from their PhD topic and are central to the program's aim to foster greater interdisciplinarity. All placements are with world-leading scientific leaders and internationally-renowned labs. The program works with Fellows after selection to identify and secure a placement that will best achieve each individual's objectives. We work with each placement host to ensure fellows benefit from a stimulating, challenging, and rewarding environment.

Schmidt Science Fellows undertake a postdoctoral placement at a disciplinary pivot from their PhD topic. Following their placement, Fellows may consolidate their disciplinary shift or take their new knowledge back to their original discipline, progressing into a broad range of destinations.

PhD in original field

Schmidt Science Fellows Post Doc placement + pivot

Return to original discipline

Consolidate shift into new discipline

Further Post Doc

Additional Schmidt Science Fellows support

Faculty position

Industry

Non-profit

Our Fellows benefit from a personalized mentoring program, providing personal and scientific support from experienced and internationally-accomplished scientists. The mentoring equips Fellows to maximize the opportunity of their placement, to build their own networks, and to plan their future career paths. Mentoring and scientific guidance on specific and specialized topics are arranged for Fellows' unique professional development needs.

Fellows receive a stipend of $100,000 to support their personal and living costs for the duration of the Fellowship placement.

Schmidt Science Fellows attend four convenings as a cohort during their Fellowship year. This Global Meeting Series is held around the world to enable our Fellows to engage with new concepts, to visit leading science facilities, and to interact with internationally-renowned thought-leaders from science, business, policy, and society.

Through the Global Meetings, the Fellows receive the training required to become scientific leaders, including:

■ Ethical leadership development and management of interdisciplinary teams

■ Communication (oral communications, presentation skills, grant writing, pitching their ideas to varied stakeholders, data visualization)

■ Exposure to cutting-edge science and scientists in world leading laboratories outside of their home field

■ Exploring the intersection between science and both the public and private sectors

■ Science policy and advocacy

By the end of the Fellowship year, Schmidt Science Fellows will be able to:

■ Recognize the importance of interdisciplinarity

■ Take concepts from one field and apply them to a related field

■ Identify ways to take scientific risks and persevere in the face of failure

A lifelong community

Upon selection, Schmidt Science Fellows join a lifelong community. Through working together, sharing experiences, and interacting with new concepts, they forge bonds with other Fellows. They also build networks with the thought leaders they meet. The Fellowship supports, guides, and challenges its members throughout their careers to achieve more than they could on their own. On completing their placements, Fellows become members of the Schmidt Science Fellows alumni community with continued opportunities to interact with other Fellows and the program.

Network & Contacts

Lifelong Fellowship

Global Meeting Series

Postdoctoral Placement

Fellows' Community & Collaboration

Mentoring & Advice

The Fellowship is built on a foundation of complementary and inter-connected elements to support Fellows as emerging science leaders and to enable them to achieve accelerated impact.

Selection

The Schmidt Science Fellows program works with the world's leading science and engineering research institutions to identify the most outstanding candidates for our Fellowship. We seek those individuals with a special degree of brilliance and curiosity. They are risk-positive, interested in crossing disciplinary boundaries, and want to improve society through their science. Successful applicants will be equipped with the tools and opportunities to drive world-changing advances. Our cohorts represent the diversity of the world in which they are drawn from in terms of their varied fields of interest, gender, ethnicity, background, and national origin.

Candidates for nomination must have completed, or be expected to complete, all of the requirements for the conferral of their PhD in the natural sciences, engineering, computing or mathematics within the year prior to the commencement of the Fellowship.

Institutions use their own internal processes to select nominated candidates between June and August each year. Nominated candidates are then contacted by the Schmidt Science Fellows program team and invited to make an individual application by November.

Applications are subject to a rigorous and robust multi-stage process. This includes an academic review to select a long-list of candidates who then go through an interview process in February of each year. Candidates selected for the final stage are invited to attend an in-person panel interview ahead of the announcement of the next class of Fellows in April.

The Fellows 2018

The inaugural class of Schmidt Science Fellows was announced in April 2018 at an event in New York City.

The 2018 Fellows are 8 men, 6 women, representing 9 nationalities, from 12 nominating universities in 4 countries. Their PhDs covered disciplinary areas including: synthetic biology, molecular physiology, condensed matter physics, photonics, bioengineering, geophysics, computational genomics, and astrophysics.

Karl Barber

PhD Institution: **Yale University**

Postdoctoral institution and lab:
Elledge Lab, Brigham & Women's Hospital, Harvard Medical School

Karl achieved significant advances in synthetic biology during his PhD, developing a system to change the way proteins are synthesized in E. coli in order to produce authentic human-like proteins for fundamental biological studies and applications in medical research. As a Schmidt Science Fellow, Karl has moved to Harvard to work in biomolecular engineering and technology development.

Driven by a personal motivation following the loss of a close friend to a rare form of cancer, Karl hopes his work will underpin a shift in personalized medicine. Researchers hope that in the future doctors will be able to treat patients with targeted therapies, attuned to their individual manifestation of the disease and response to treatment, rather than broad and non-specific approaches.

Karl's work, with Dr Stephen Elledge, is developing personalized peptide arrays that will act as a valuable diagnostic tool to tell doctors how best to treat a patient's disease. When used with standard DNA technology, including sequencing of a patient's genome or tumor, this methodology could open new avenues for assessing disease, exploring new treatments, or reducing the side-effects of existing therapies.

Karl strongly believes that it is important to see and to frame his science in ways that have the clearest relevance for patients and clinicians.

Fahim Farzadfard

PhD Institution: **MIT**

Postdoctoral institution and lab: **Boyden Lab, MIT, and Church Lab, Harvard Medical School**

Fahim obtained his first degrees in biotechnology from the University of Tehran, Iran. He brought together his interests in the life and physical sciences with a move into synthetic biology and to the USA. During his PhD at MIT, Fahim developed multiple foundational platforms for molecular recording and computation in living cells. He introduced the concepts of DNA-based molecular recording and analog memory and invented SCRIBE (Synthetic Cellular Recorders Integrating Biological Events), a modular and scalable platform for recording signaling dynamics into the cell's own genomic DNA.

Fahim's successful academic record and research excellence have been recognized by multiple awards including the Harold M. Weintraub Graduate Student Award, Nat. L. Sternberg Graduate Thesis Prize, Helen Peake Carr Research Prize, the Regeneron Prize for Creative Innovation, and now a Schmidt Science Fellowship.

As a Schmidt Science Fellow, Fahim is working across two labs, with George Church at Harvard and Ed Boynton at MIT. He is aiming to further advance molecular recording technologies and apply them to the study of the brain. The focus on neurology is taking Fahim back to matters close to his heart and ensuring his work has the greatest potential of long-term impact.

Wes Fuhrman

PhD Institution: **Johns Hopkins University**

Postdoctoral institution and lab: **Paglione Group, University of Maryland College Park**

Wes pursued both experimental and theoretical physics during his PhD at Johns Hopkins University, including investigating novel materials that demonstrate the ability to be both a conductor and an insulator. As a Schmidt Science Fellow, he is now expanding his work in quantum materials, moving to the lab of Johnpierre Paglione at UMD College Park.

His PhD work gave Wes expertise in the physics of unusual materials, including skills needed to utilize cutting-edge tools of large-scale scientific facilities, both domestic and international. With his focus now on the synthesis and application of quantum materials, Wes leverages the new-to-physics mathematical concept of topology to discover and understand superconducting and topological materials that will help to develop new quantum applications. Wes is following a fundamental, curiosity-driven approach, focused on materials which could have transformative applications in energy, computing, and more.

Wes already has rich experience of crossing boundaries. An alumnus of Berklee College of Music, he played the guitar, bass, piano, drums, and more, in a broad variety of styles. Working in music production and performance, he entered science through a personal curiosity, starting with a community college course in physics. After graduating summa cum laude from UC Irvine, Wes moved to the US east coast with a focus on the physics of materials.

Xiwen Gong

PhD Institution: **University of Toronto**

Postdoctoral institution and lab: **Bao Group, Stanford University**

Xiwen undertook her PhD at the Sargent group at the University of Toronto, having moved to Canada from China. At Toronto she explored luminescent nanoparticles, known as colloidal quantum dots, that have applications in converting light into renewable energy and developing efficient light sources. As a Schmidt Science Fellow, she will be working at Stanford to apply machine learning techniques and photonics expertise to advance progress in flexible electronics.

The importance and potential impact of Xiwen's work is nearly impossible to overstate. The global growth in demand for cheap and flexible renewable energy is proving relentless and is a necessity for the global economy to move away from fossil fuels. Xiwen's work as a Fellow aims to develop low-cost, large-area, and stretchable devices including efficient solar cells, light sensors, and light emitters. This work opens the potential for many far-reaching applications, including wearable electronics and artificial skins.

Yogesh Goyal

PhD Institution: **Princeton University**
Postdoctoral institution and lab: **Raj Lab, University of Pennsylvania**

Yogesh completed his PhD in chemical and biological engineering at Princeton where he worked on studying how the dynamics of chemical signals control animal development. Now at Penn, he is shifting his science into single cell biology, aiming to understand how cells are organized and communicate in response to pathogenic perturbations.

The focus of Yogesh's current work is understanding drug resistance in cancer cells. He wants to find out why a rare subset of cells are able to survive longer than others even when in the presence of drugs that should kill them. Yogesh's science has the potential to improve cancer therapies and provide insights into the basic understanding of origins of resistance in various disease contexts.

Yogesh is passionate about crossing boundaries and working with all types of disciplines. Hailing from rural India, Yogesh is not only a first-generation high school, college, and PhD graduate, but he is also the first in his family to travel abroad for his studies. In addition to working at the intersection of engineering and biology, he is also passionate about working with artists and poets, and advocating for art and science partnerships in research and teaching. Yogesh has personally worked with artists on several projects and recently published on the evolving relationships between art and science.

Peyton Greenside

PhD Institution: **Stanford University**
Postdoctoral institution and lab: **Brunskill Group, Stanford University**

Peyton completed her PhD in biomedical informatics and is now working to apply machine learning techniques to experimental design.

Scientists can now detect signs of cancer in blood samples through looking for pieces of mutated tumor DNA. Peyton is working to design primers that can detect tens of thousands of possible mutations quickly and cheaply in a blood sample. Frequently such primers are tested in a trial and error approach, which can be time-consuming, wasteful, and often ineffective.

Peyton's work is to develop machine learning methods that optimize the design of primers and synthetic DNA sequences as efficiently as possible. These algorithms can then predict which experiments would be most effective for a scientist to perform next.

Peyton's research as a Schmidt Science Fellow, working with Prof Emma Brunskill at Stanford, could make an important impact on the study and treatment of cancer.

Abbie Groff

PhD Institution: **Harvard University**
Postdoctoral institution and lab:
Page Lab, Whitehead Institute for Biomedical Research

Abbie trained as a systems biologist during her PhD at Harvard, and her early work focused on characterizing a set of noncoding mammalian genes. She is now working as a Schmidt Science Fellow under David Page at the Whitehead Institute in Cambridge, Massachusetts, exploring the molecular differences between the sexes. Specifically, she is interested in the contribution of different sex chromosome complements to transcriptional events occurring in the very earliest stages of human embryonic development, before sex hormones begin to have an influence.

Abbie's science has potentially huge implications first through clarifying the role of sex chromosome complement in this unique system, and second by updating our view of this very early stage of human development to include the context of chromosomal sex.

Abbie is passionate about the importance of communicating science and engaging with the public around their hopes, concerns, and aspirations with regard to the application and future of scientific progress. Having grown up in a religious community in rural Pennsylvania, she recognizes the power of genuine dialogue about the benefits and implications of technology.

Hal Holmes
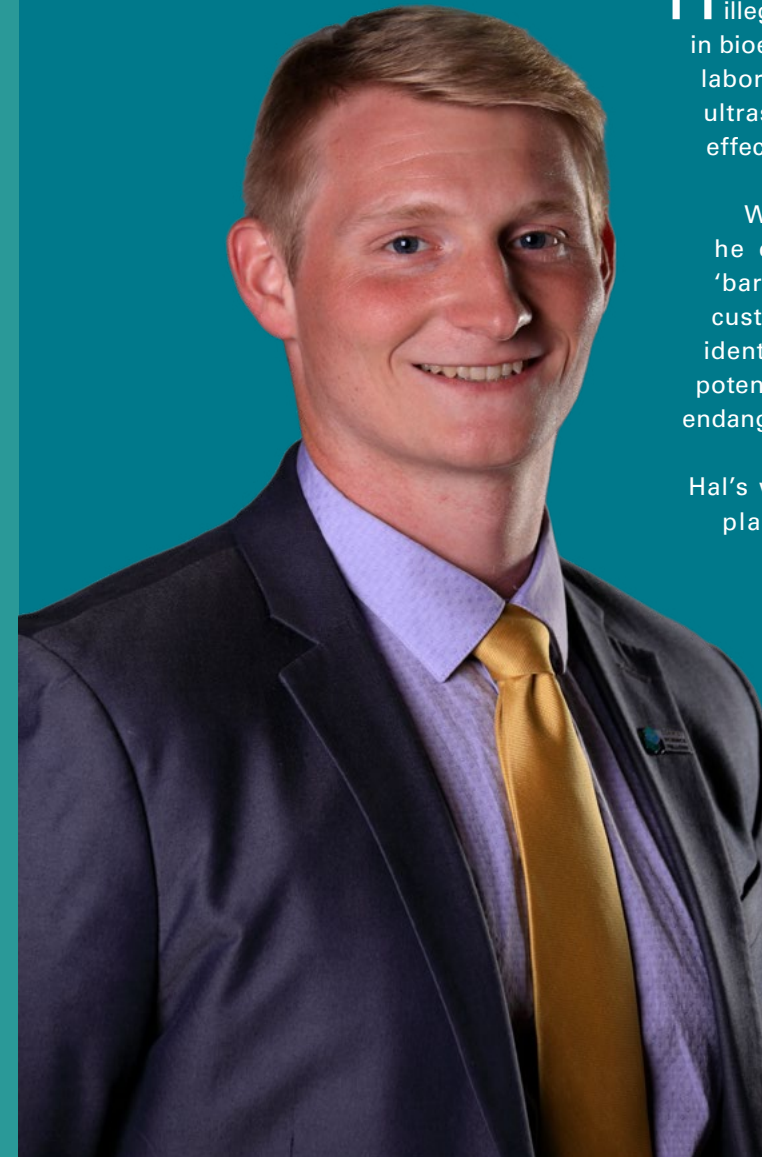
PhD Institution: **University of Washington**
Postdoctoral institution and lab: **Vlaisavljevich Lab, Virginia Tech**

Hal is an engineer determined to use science to tackle the illegal trade in endangered species products. With a PhD in bioengineering, Hal is now working in a cancer research laboratory with Dr Eli Vlaisavljevich at Virginia Tech on ultrasound-based technology to advance techniques to effectively extract DNA from timber samples.

When combined with his previous work, where he developed a battery-powered, hand-held, DNA 'barcode scanner' for use by wildlife protection and customs officers in the field to rapidly and accurately identify animal and timber products, this work has the potential to revolutionize the battle against illicit trade in endangered species.

Hal's work has the potential for impact on a genuinely planetary scale. The illegal trade in endangered species is worth an estimated $100bn a year and is contributing to the human-induced mass extinction that is devastating not just the amazing ecosystems of our planet but also the human societies that rely on them.

Hal has been named a Moore Inventor Fellow, the first not-for-profit innovator to be recognized by that program. The Moore support will enable Hal to pursue the development of his invention over the next three years with Conservation X Labs.

Jina Ko

PhD Institution: **University of Pennsylvania**

Postdoctoral institution and lab:
Weissleder Lab, Massachusetts General Hospital, Harvard Medical School

During her PhD at Penn, Jina made significant advances in the engineering of microfluidics that could be used to detect lethal diseases at the earliest stages of development and which do not have conventional biomarkers. Her research demonstrated promising results in diagnosing both early-stage pancreatic cancer and different injury states of traumatic brain injury.

As a Schmidt Science Fellow, she has moved to Boston to work at Massachusetts General Hospital under Prof Ralph Weissleder of MGH and Harvard University, to explore how her diagnostic technology can be most effectively deployed in the clinic. Jina's science could save lives around the world through the ability to diagnose heterogeneous and complex disease (e.g. cancer) using blood-based biomarkers, improving therapeutic efficacy and patient response.

Jina is also using her placement at Harvard to delve deeper into nanofabrication, imaging, and droplet microfluidics and to expand her knowledge of immunotherapy.

Fred Richards

PhD Institution: **University of Cambridge**

Postdoctoral institution and lab: **Mitrovica Group, Harvard University**

Fred trained as a geophysicist at the University of Cambridge where he worked to understand changes in Earth's topography caused by the flow of hot rock within our planet's interior. As a Schmidt Science Fellow, he has crossed the Atlantic to Harvard University where he is studying prehistoric sea levels to develop new insights into how climate change may affect coastal communities. He is passionate about strengthening the role of scientific evidence in policymaking, especially in climate and energy policy.

Fred is working in Prof Jerry Mitrovica's group to determine how high the global sea level was during the Pliocene epoch. This period, around three million years ago, was the last time atmospheric CO2 levels were as elevated as they are today. The potential impact of Fred's work will come from combining this study of prehistoric precedent with his previous insights into the behavior of Earth's interior to create new, more accurate predictions of future sea-level rise.

Mattia Serra

PhD Institution: **ETH Zurich**
Postdoctoral institution and lab: **The Applied Math Lab, Harvard University**

Mattia develops mathematical techniques to understand turbulent and unpredictable change in the world. He completed his PhD in nonlinear dynamics at ETH Zurich, Switzerland, having previously studied in Italy, China, and the Netherlands. As a Schmidt Science Fellow, Mattia is working with L. Mahadevan at Harvard to switch his mathematical modeling from physical systems to biological systems, including human embryonic development.

Mattia's mathematical models have already proven their value in collaborations with organizations such as MIT and the US Coast Guard, where uncovering coherent attractors and eddies in the ocean can help to direct search and rescue operations. He is now applying this knowledge to complex biological systems and the modeling of cell flows during early development of growing embryos. The work has the potential to better understand and predict the evolution and growth of the neural tube and brain development, as well as uncover the driving mechanisms behind embryogenesis.

Adi Steif

PhD Institution: **University of British Columbia**
Postdoctoral institution and lab: **Marioni Group, Cancer Research UK Cambridge Institute, University of Cambridge**

During her PhD at UBC in Vancouver, Canada, Adi established herself as a promising cancer researcher. She made contributions to our understanding of breast cancer evolution and methods for single-cell whole genome sequencing. Adi is now working with Prof John Marioni in Cambridge, UK and is using her placement as a Schmidt Science Fellow to develop her skills in probabilistic modelling and machine learning.

Adi plans to bring her experience in cancer research and advances in computational approaches together to generate new insights into single-cell biology during normal development and early carcinogenesis.

Ryan Truby

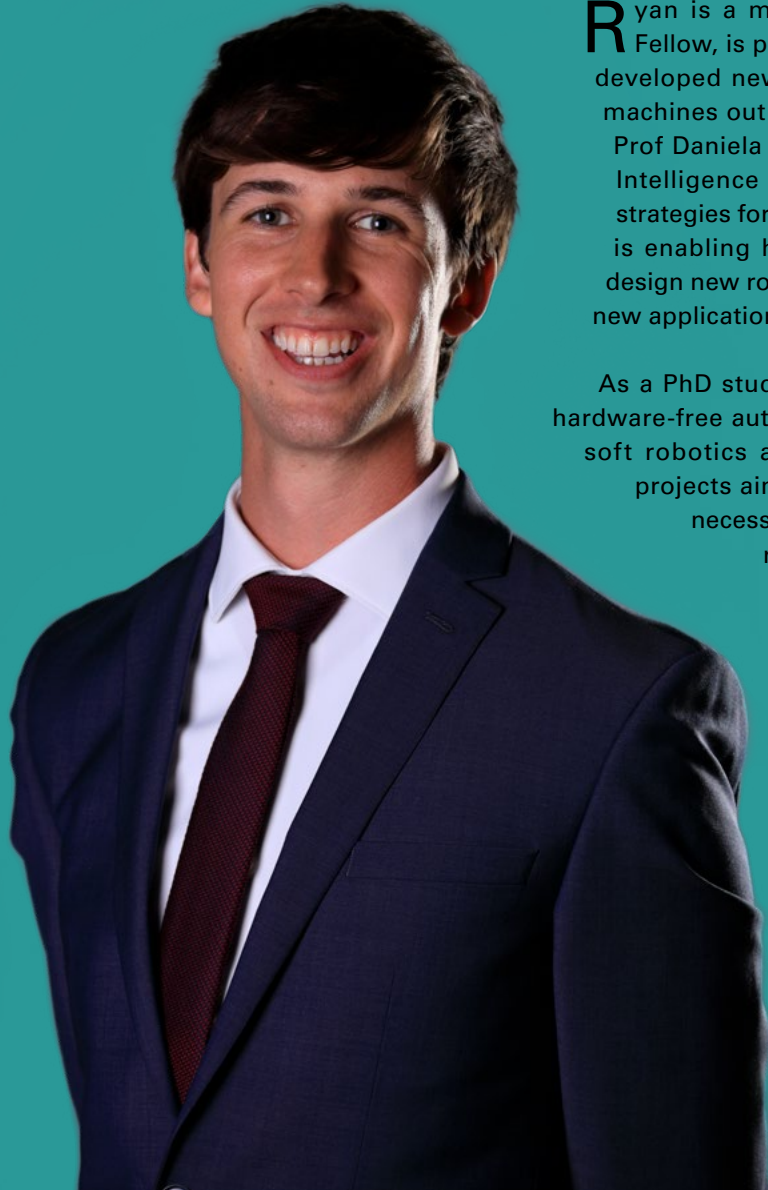PhD Institution: **Harvard University**
Postdoctoral institution and lab: **Distributed Robotics Laboratory, MIT**

Ryan is a materials engineer who, as a Schmidt Science Fellow, is pivoting to work in robotics. During his PhD, Ryan developed new ways to use 3D printing techniques to create machines out of functional soft materials. Now, working with Prof Daniela Rus within the Computer Science and Artificial Intelligence Lab at MIT, Ryan is investigating new control strategies for soft and compliant robots. His pivot into robotics is enabling him to bridge his two fields and, by doing so, design new robots with unprecedented capabilities and explore new applications for soft robotics.

As a PhD student Ryan invented the 'Octobot', a world-first, hardware-free autonomous soft robot. The potential of genuinely soft robotics and autonomous control is huge. His current projects aim to use soft robotic manipulators that have the necessary biomimetic sensory feedback to improve how robots manipulate objects for a variety of tasks. The technology could revolutionize product handling, manufacturing, human-machine interfaces, and many other applications that are difficult or inappropriate with traditional "rigid" robots.

Ryan grew up in West Texas and took his first degree at The University of Texas at Austin.

Jielai Zhang

PhD Institution: **University of Toronto**
Postdoctoral institution and lab: **Noble Group, University of Oxford**

Jielai was born in China before moving to Australia where she grew up and studied for her first degree. She completed her PhD in Canada at the University of Toronto in astrophysics and astronomy, studying galaxy evolution and formation, and low surface brightness imaging. As a Schmidt Science Fellow, Jielai is pivoting from astrophysics to medical imaging, with the aim of bringing the strengths of both fields together.

Jielai is completing her Fellowship placement with Prof Alison Noble at the University of Oxford. She is working across two projects. The first project is to produce refined atlases of the developing fetal brain using 3D ultrasound data alongside algorithmic processes to learn about the brain development of fetuses affected by congenital heart disease or born small for their gestational age. The second is to use routine fetal ultrasound videos and related multi-modal data to explore the systematic improvement of clinical image recording. Jielai's science has the potential to improve ante-natal monitoring and fetal outcomes.

Jielai has a strong commitment to international scientific collaboration and has played a key role in the development and organization of the West Africa International Summer School for Young Astronomers.

Our partners

Schmidt Science Fellows was launched in 2017 by Eric Schmidt and Wendy Schmidt and is a program of Schmidt Futures, delivered in partnership with the Rhodes Trust. The program has an initial commitment of at least $25 million for the first three years, and is the beginning of a broader $100 million effort by Eric Schmidt and Wendy Schmidt to promote scientific leadership and interdisciplinary research over the next decade and beyond.

Schmidt Futures

Schmidt Futures is a philanthropic initiative, founded by Eric Schmidt and Wendy Schmidt, that seeks to improve societal outcomes through the thoughtful development of emerging science and technologies that can benefit humanity.

To realize this vision, Schmidt Futures uses a broad set of tools — including gifts, grants, investments, and start-up activity — for charitable, educational, and commercial efforts with a public purpose.

Schmidt Futures brings together the efforts of various charitable and non-charitable entities to improve our potential impact by making diverse types of capital available to the efforts we support.

www.schmidtfutures.com

The Rhodes Trust

The Rhodes Trust, based at the University of Oxford, brings together and develops exceptional people from all over the world, and in all fields of study, who are impatient with the way things are and have the courage to act.

The Rhodes Scholarships are postgraduate awards providing transformative educational opportunities. Established in 1903, they are the oldest and perhaps the most prestigious international graduate scholarship programme in the world. Nearly 8,000 Rhodes Scholars have gone on to serve at the forefront of government, education, the arts, NGOs, commerce, research and other sectors. They are well known advocates for expanded social justice, and have advanced the frontiers of science and medicine.

www.rhodeshouse.ox.ac.uk

For more information about Schmidt Science Fellows, our Fellows, and our application process please visit: www.schmidtsciencefellows.org

Follow us and connect on social media:

@SchmidtFellows

@schmidt_science_fellows

@schmidtsciencefellows

schmidt-science-fellows

For regular updates and news from Schmidt Science Fellows and our Fellows sign up for our regular news email at:

schmidtsciencefellows.org/email-updates/

Schmidt Science Fellows, in partnership with the Rhodes Trust
Rhodes House
South Parks Road
Oxford
OX1 3RG
UNITED KINGDOM

Email: info@schmidtsciencefellows.org
Tel: +44 1865 280 256